PRML Assignment 1

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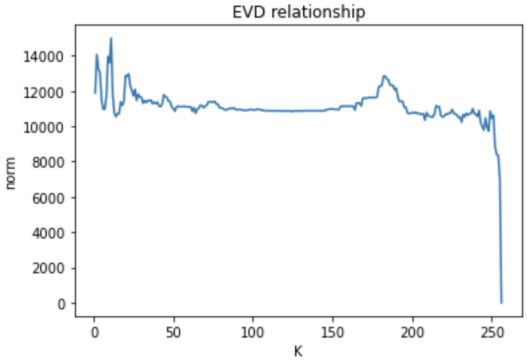
January 31, 2022

1 Motivation

To learn the way image processing works to some extent and to identify the relationships between the quality of the image and the chosen significant (magnitude) eigenvalues/singular of the image matrix.

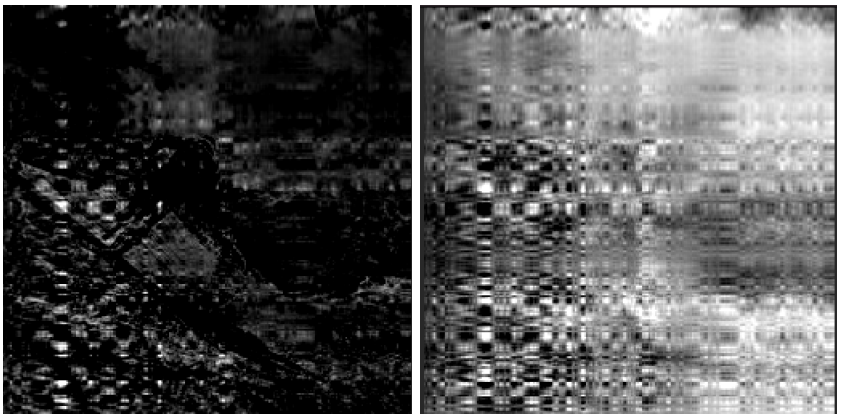
2 EVD

We will try to analyse the relationship between the frobenius norm of the reconstructed image and the original image with K (the top K eigenvalues from the sorted eigenvalue matrix in descending order)

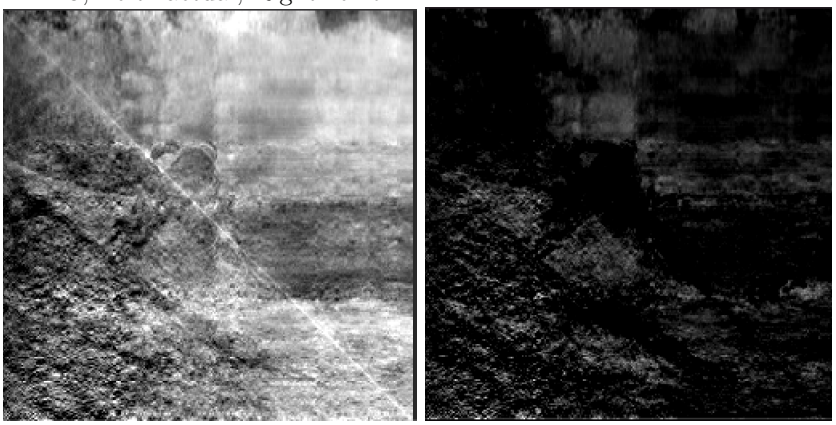


(**Note**: I am trying very hard to get to speed with everyting this course expects us to do and i know that this plot is wrong but this is all i could manage).

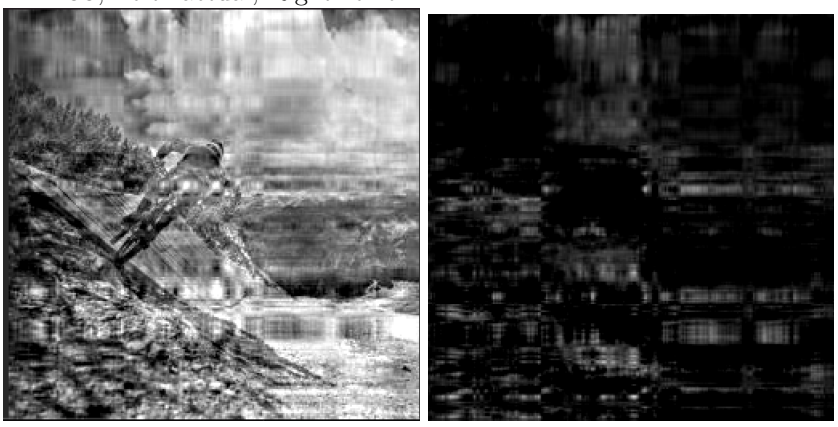
We notice that the norm reduces as we increase the detail (number of eigenvalues).Running the code with different values of K we see that the error image is the most white when K=10 and almost black with K=255. Again, this shows that the error reduces as K increases.



K=10, Left=actual, Right=error

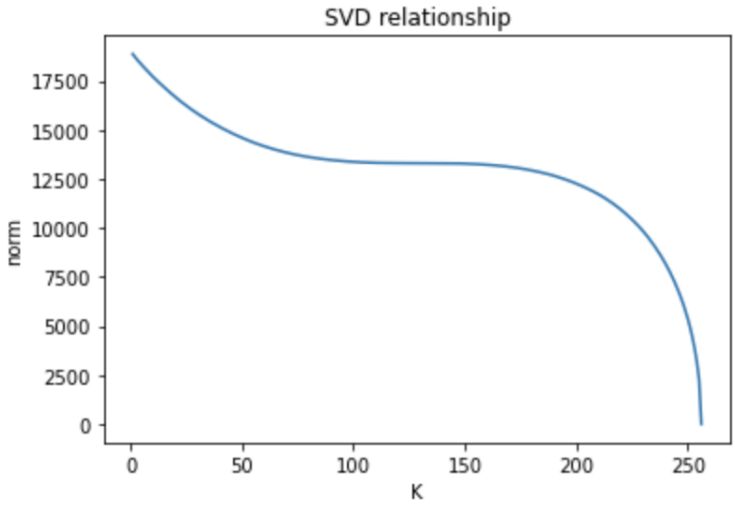


K=100, Left=actual, Right=error



K=250, Left=actual, Right=error

3 SVD



(**Note**: Again I'm not too sure about this)

This plot shows that the norm reduces drastically owing to the higher significance of the larger top K values.

4 Result and Inference

SVD produces better and smooth curves which makes its implementation in image processing much simpler than EVD which ofter has complex eigenvalues as compared to the real positive singular values obtained in SVD.